



3D Graphene-based bio-cathode for Carbon dioxide reduction in Microbial Electrosynthesis

Aryal, Nabin; Halder, Arnab; Tremblay, Pier-Luc; Chi, Qijin; Zhang, Tian

Published in:
Book of Abstracts. DTU's Sustain Conference 2015

Publication date:
2015

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Aryal, N., Halder, A., Tremblay, P-L., Chi, Q., & Zhang, T. (2015). 3D Graphene-based bio-cathode for Carbon dioxide reduction in Microbial Electrosynthesis. In *Book of Abstracts. DTU's Sustain Conference 2015* [P-2] Technical University of Denmark.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

3D Graphene-based bio-cathode for Carbon dioxide reduction in Microbial Electrosynthesis

Nabin Aryal¹, Arnab Halder², Pier-Luc Tremblay¹, Qijin Chi², Tian Zhang^{1*}

1: Novo Nordisk Foundation Center for Biosustainability, Technical University of Denmark, Kogle Allé 6 DK-2970 Hørsholm

2: Department of Chemistry, Technical University of Denmark, Kemitorvet, 2800, Kgs. Lyngby, Denmark

*Corresponding author email: zhang@biosustain.dtu.dk

Microbial electrosynthesis (MES) is an attractive strategy to utilize carbon dioxide as a carbon source and electron from externally polarized cathode for the synthesis of multi-carbon chemical commodities. This technology is one of the efficient technologies for sequestration and conversion of carbon dioxide into the organic chemical. The electro-autotrophic bacteria fix CO₂ via Wood-Ljungdahl pathway and accept electrons from the cathode. This technology mainly depends on the performance of the electro-autotrophic bacteria; cathode material and reactor set up for the enhancement of microbe-electrode electron transfer. For the first time, we reported the catalytic activity of three-dimensional graphene-based electrodes in microbial electrosynthesis (MES) for Carbon dioxide gas reduction in pure culture platform. The carbon felt was modified with three-dimensional graphene for the enhancement of electron transfer in microbial electrosynthesis. The three-dimensional graphene-enhanced the adherence of bacterial cell on the electrode interface and formed the thick biofilm and hence production rate was increased by fivefold compared to the unmodified electrode

Keywords: - Microbial electrosynthesis, CO₂ reduction, Three-dimensional graphene, *Sporomusa ovata*